

## REMARKS

Claims 21-27 and 29-35 are pending in the present application. Claim 1-20 and 28 was previously cancelled. Claim 30 has been amended. No new matter has been added. Applicant respectfully requests reconsideration of the claims in view of the following remarks.

Claims 21, 25-27, 30 and 33-35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Lucas et al. (U.S. Patent No. 6,287,951 B1, hereinafter "Lucas") in view of Chen et al. (U.S. Patent No. 6,720,252 B2, hereinafter "Chen"). As will be discussed in detail below, Applicants respectfully disagree.

First, it is noted that the Chen reference has a priority date of July 30, 2002. However, the present application was originally filed as a German Application 102 29 188.8 and has a priority date of 28 June 2002 as is clearly set forth in the original U.S. Application and PTO form 1390 that accompanied the U.S. Application. A verification that the application as filed was a true and accurate translation of the original German Application was also filed on November 4, 2005. Therefore, the Chen reference and any other reference having a filing date subsequent to 28 June 2002 is not a proper reference.

Furthermore, Applicants respectfully disagree that the Lucas reference discloses the elements of the present claim as alleged by the Examiner. More specifically, with respect to independent claim 21, the Examiner acknowledges that Lucas does not explicitly teach filling the contact hole with an ARC layer that also overlies the patterned hard mask 13 and the insulating layer. Applicants respectfully take exception to the statement "does not explicitly teach" as being too generous. More specifically, Lucas does not ever suggest, much less *implicitly teach* filling the contact hole with an ARC layer.

In addition, the Examiner states that Lucas teaches the elements of “depositing and patterning” a photoresist layer on the ARC layer [that fills the contact hole] and removing portions of the insulating layer and *portions of the hard mask* not covered by the photoresist to *re-pattern said hard mask*. However, there is no teaching whatsoever in Lucas of “re-patterning” the hard mask. Lucas patterns the hard mask only one time. He never “re-patterns” the hard mask. To “re-pattern” requires it to be already patterned a first time. In light of the teachings in the specification, it is respectfully submitted that it is not correct to take the position that patterning the original hard mask layer only the one single time is re-patterning as required by the claims. Further, simply depositing a layer of hard mask material cannot be considered patterning the hard mask.

Also, to argue that Lucas “re-patterns”, the Examiner must ignore his own acknowledgement that Lucas does not teach filling the contact hole with an ARC layer and the required order of the method steps of the invention that must be followed. Further, the Examiner cannot properly argue that Lucas meets a first portion of a claim element while ignoring the remainder of the element requirements. More specifically although not explicitly stated, it is clear that the contact hole of the present invention must already exist before the ARC layer can “fill the contact hole” and therefore, of course, before the photo resist is deposited and patterned “on top of the ARC” layer. Yet the Figures 3, 4 and 5 and the accompanying text referred to by the Examiner as teaching these elements are all related to the one time patterning of the hard mask 34 that *form the contact hole 41*. Therefore, it is impossible for Lucas to meet the requirement of depositing and patterning the photo resist layer “on the ARC layer *that fills the contact hole*” since the purpose of the photo resist and patterning disclosed by Lucas is to form the contact hole 41. Further, of course, since Lucas cannot meet the claim element of “depositing

and patterning the photo resist” Lucas also cannot meet the next elements of the claim that requires “removing portions of the insulating layer to re-pattern the hard mask” since Lucas only taught a single patterning of the hard mask. Finally, since the ARC layer of Lucas never filled the contact hole, it is impossible to remove the ARC layer from the contact hole as also required by the claim.

Claims 22-24 and 29-32 were also rejected under 35 U.S.C. § 103(a) as being unpatentable over Lucas in view of Chen and in further view of one or more of Gruening-Von Schwerin et al. (hereinafter “Gruening-Von Schwerin”) and Carey. Again, Applicant respectfully disagrees. The Gruening-Von Schwerin reference does not overcome the short coming of Lucas and Chen as discussed above. For example, it is clear that Gruening-Von Schwerin does not even suggest patterning the hard mask for forming contact holes or vias and then *re-patterning the same hard mask* for forming trenches for conductor lines as required by the claims. More specifically, figs 1A-1D and figs 2A-2C clearly show and the corresponding text describes that the hard mask M is completely patterned with openings 01, 02 and 03 in one etching operation. (See paragraph [0046], line 1; paragraph [0056], line 1 and paragraph [0057]). These openings 01, 02 and 03 are then used for etching the insulation layer 55 to form contact holes or vias K<sub>1</sub>, K<sub>2</sub> and K<sub>3</sub>. In the embodiments discussed by Gruening-Von Schwerin, contact holes K<sub>2</sub> and K<sub>3</sub> are etched into insulation layer 55 after the etching of contact hole K<sub>1</sub>, but the hard mask is never *re-patterned*. The Examiner alleges that paragraph [0058] discloses re-patterning of layer M of the hard mask to define a conductor trench 70. This simply is not what Gruening-Von Schwerin discloses. The reference discloses that an *auxiliary layer* HS is patterned by Lithography. However, the auxiliary layer HS is not the same layer or materials as hard mask M. Therefore, it is clear that Gruening-Von Schwerin does not even suggest much less teach a hard mask that is

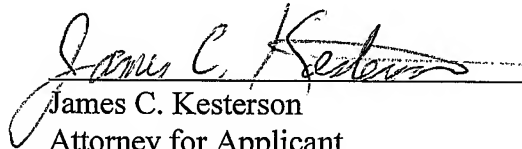
first used to pattern a contact hole and is then subsequently re-patterned to form a conductor line trench as required by the claims.

Similarly, Carey certainly does not overcome the shortcomings of Lucas and/or Chen as discussed above. Therefore, it is respectfully submitted that all of the claims do potentially define over all of the references whether considered singly or in combination and that the application is allowable.

Applicant has made a diligent effort to place the claims in condition for allowance. However, should there remain unresolved issues that require adverse action, it is respectfully requested that the Examiner telephone James C Kesterson, Applicant's attorney, at 972-732-1001 so that such issues may be resolved as expeditiously as possible. In the event that the enclosed fees are insufficient, please charge any additional fees required to keep this application pending, or credit any overpayment, to Deposit Account No. 50-1065.

Respectfully submitted,

10 January 2000  
Date

  
James C. Kesterson  
Attorney for Applicant  
Reg. No. 25,882

SLATER & MATSIL, L.L.P.  
17950 Preston Rd., Suite 1000  
Dallas, Texas 75252  
Tel.: 972-732-1001  
Fax: 972-732-9218